Alternative Naval Force Structure

A compendium by

CIMSEC

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Preface

By Dmitry Filipoff

From October 3 to October 7, 2016, CIMSEC ran a topic week where contributors proposed alternative naval force structures to spur thinking on how the threat environment is evolving, what opportunities for enhancing capability can be seized, and how navies should adapt accordingly. Contributors had the option to write about any nation's navy across a variety of political contexts, budgetary environments, and time frames.

Relevant questions include asking what is the right mix of platforms for a next-generation fleet, how should those platforms be employed together, and why will their capabilities endure? All of these decisions reflect a budgetary context that involves competing demands and where strategic imperatives are reflected in the warships a nation builds. These decisions guide the evolution of navies.

In a modern age defined by rapid change and proliferation, we must ask whether choices made decades ago about the structure of fleets remain credible in today's environment. Navies will be especially challenged to remain relevant in such an unpredictable era. A system where an average of ten years of development precedes the construction of a lead vessel, where ships are expected to serve for decades, and where classes of vessels are expected to serve through most of a century is more challenged than ever before.

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About Us

The Center for International Maritime Security (CIMSEC) is a 501(c)3 non-partisan think tank incorporated as a non-profit in the state of Maryland. CIMSEC was formed in 2012, and as of 2015 has members and chapters in more than 30 countries. CIMSEC does not take organizational positions, and encourages a diversity of views in the belief that a broad range of perspectives strengthens our understanding of the challenges and opportunities in the maritime domain.

If you are interested in forwarding the discussion on safeguarding prosperity on the sea, consider becoming more involved in our organization at www.cimsec.org.

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COVER PHOTO: The guided-missile cruiser USS Gettysburg fires a Harpoon anti-ship missile at the ex-USNS Saturn during a sinking exercise October 27, 2010. (Navy Visual News Service/Photo by Seaman Apprentice Leonard Adams)

The Perils of Alternative Force Structure

By Steve Wills

Navies have historically sought alternative force structures in response to changes in their nation's grand strategy, rising costs of maintaining existing force structure, advances in technology, and combinations of these conditions. While initially appealing in terms of meeting new strategic needs, saving money, and gaining offensive and defensive superiority over an opponent, such changes are fraught with danger if undertaken too quickly, are too radical in tone, or do not account for the possibility of further change. Some are built "from the bottom up" on ideal tactical combat conditions, but do not support wider strategic needs. Even the best alternative force structure that meets strategic needs, is more affordable than previous capabilities, and outguns the enemy could be subject to obsolescence before most of its units are launched. These case studies in alternative force structure suggest efforts are often less than successful in application.

The American Civil War Ironclads

One of the most familiar alternative force structures was that of the United States Navy in response to the revolutions in steam power, armor, and rifled cannon in the late 1850s. The impending appearance of the rebel warship CSS Virginia (the former steam frigate USS Merrimac) during the American Civil War triggered a crash course in ironclad warship experimentation in the Federal Navy. When Virginia did appear, the only one of these experiments ready for battle was Swedish engineer John Ericsson's USS Monitor, a revolutionary craft in comparison to both the Federal fleet's current force structure and other experimental craft. The success of Ericsson's craft against the Virginia spawned over 60 other low freeboard armored vessels with one, two, and even three turrets. Despite several losses, including that of the namesake ship, to weather conditions, and one (USS Tecumseh) to a torpedo (mine) hit, the monitor type ships had a remarkable record of combat success in coastal and riverine environments during the Civil War.

Unfortunately, the return of peace and the need to maintain overseas naval squadrons to protect U.S. economic interests spelled an end to the dominance of the monitor in U.S. naval force structure. One conducted a high-profile overseas visit to Europe while a second managed to sail around Cape Horn only to be immediately decommissioned upon arrival in San Francisco. Monitor-type ships had poor seakeeping capabilities outside coastal waters and did not carry enough coal for extended operations. The U.S. had not developed the high-freeboard sail and steam warships that other powers had constructed, and in any case U.S. strategic interests had changed to where monitors were no longer necessary components of naval force structure. Nearly all were decommissioned and scrapped or laid up in long-term reserve by 1874.

The "Jeune Ecole" (Young School) Torpedo Craft and Commerce Raiders

The "Jeune Ecole" (Young School) of French

naval strategy was the brainchild of Vice Admiral Hyacinthe-Laurent-Theophile Aube and developed in the mid to late 19th century in response to the growing battleship fleet of France's primary adversary, Great Britain. Rather than build a competing battlefleet, French strategists derived an alternative force structure designed to offset British battleship superiority and attack a perceived weakness in Britain's global maritime trade network. French designers planned for masses of small, torpedo-armed craft to launch large salvos of underwater weapons at the exposed, unarmored lower sides of British battleships. Torpedo craft were much cheaper and easier to build in numbers as opposed to battleships. They also had a successful combat record with spar-mounted weapons in the American Civil War, and later successes in the Russo-Turkish War, South American conflicts, and in the Russo-Japanese War.

Commerce raiding conducted by fast cruisers, as conduced by rebel naval forces during the American Civil War, was also seen as an asymmetric tool for combating global maritime powers with vulnerable trade routes. Defending naval forces could not be everywhere and took time to assemble in areas threatened by a surface raider.

Unfortunately, the march of technological advance that supported the tenets of the Jeune Ecole also served to undermine them. Nations whose battleships were threatened by torpedo boats developed the larger and more capable torpedo boat destroyer to escort their battleships, destroy enemy torpedo boats, and launch their own torpedo attacks against opposing forces. Advances in battleship gunnery in the first decade of the 20th century allowed capital ships to open fire at ranges greater than that of the torpedo, making daylight attacks suicidal for torpedo craft.

Surface commerce raiding also ran up against new technologies that made it largely ineffective. First, undersea communication cables and later radio allowed for long-range communication between naval leaders at home and their forces deployed around the world. Commerce raiders that had to stop to take on coal and provisions would have their locations reported much more rapidly than in past centuries, allowing naval forces to concentrate and destroy them. Radio intercepts also allowed pursuing forces to track surface raiders. British naval forces quickly identified and eliminated German cruiser formations engaged in commerce raiding once radio communications reported their positions. Raiders disguised as merchant ships persisted into the Second World War, but submarines that could submerge and operate undetected became much more effective commerce raiders.

The Jeune Ecole was also in effect a tactical concept elevated to the rank of strategy. While torpedo attacks might sink British battleships attacking French coastal waters and commerce raiders might weaken British commerce, how did the force structure promote French strategic goals? How would these formations protect France's own far-flung possessions; a colonial amalgamate that was second in size only to that of Great Britain's? How would lightly armed and armored commerce raiders and generally unseaworthy torpedo boats carry the fight to British shores if needed? The Jeune Ecole did not answer these questions of strategic employment of French naval forces.

France also reached a political settlement with Great Britain in the early 20th century and the French fleet of raiding cruisers and torpedo boats was left without an enemy. France would likely have benefited from a more balanced fleet in the First World War and struggled to catch up in the dreadnought building race that commenced shortly after its "Entente Cordiale" agreement with Great Britain.

Jackie Fisher's Fleet

Great Britain experimented with its own alternative fleet force structure at the outset of the 20th century. This was the "fleet that Jack built;" the pre-World War 1 fleet of battlecruisers, large destroyers, submarines, and other revolutionary warships that sprang from the fertile mind of British Admiral Sir John Fisher. The fiery Fisher, who in U.S. service might have resembled a combination of Admirals Hyman G. Rickover and Arthur Cebrowski, was selected to be First Sea Lord (British equivalent of the U.S. Chief of Naval Operations) in 1904 with a mandate to cut costs and increase combat capability. Fisher's answer to this problem partially involved a revolutionary new force structure of hybrid ships that combined existing classes in order to meet British strategic needs while lowering naval estimates. The battlecruiser that combined the firepower of a battleship with the speed and range of armored cruiser would speed to threatened areas of the globe and destroy slower, less well-armed enemies at long range. Defense of the United Kingdom itself

would be left to torpedo-armed large destroyers and submarines. Fisher was a strong advocate of new technologies and supported naval aviation, steam powered-submarines, director firing of warship guns, and cleaner, more efficient oil fuel for warships in place of coal.

Despite being innovative and well connected to British grand strategy, Fisher's fleet was largely obsolete in less than ten years. Britain's primary enemy changed from France and its Jeune Ecole-based trade warfare fleet to Germany that built a similar fleet of battleships and battlecruisers for operations in European waters. Apparently, Fisher never expected anyone to create a mirror image of his battlecruiser fleet. Fisher's big ships were instead assigned as heavy scouts for a British fleet expecting a fleet battle in the close confines of the North Sea.

Technology also advanced beyond Fisher's initial concepts. The fast battleship, which carried heavy guns, was well armored and had a decent turn of speed obviated the need for the specialized battlecruisers. Fisher's steam-powered submarines were ahead of their time, but plagued by technological issues that limited their effectiveness. The German surface fleet only made rare appearances and Germany's merchant fleet was largely interned or destroyed by the end of the first year of war, leaving few targets for Fisher's submersibles. The Battle of Jutland, the one great naval encounter of the war, did not offer proof that Fisher's force structure was right or wrong. Instead, poor tactical doctrine (not a lack of armor) caused significant casualties among Fisher's battlecruisers. The less than satisfactory results left the Royal Navy with a haunting experience of frustration and regret that would not be extirpated until the Second World War. He was out of power and office by 1916 due to his repeated clashes with his protégé Winston Churchill over the conduct of the Dardanelles campaign. Fisher's revolution achieved much for the Royal Navy in its first five years, but was effectively over after the first two years of the First World War.

Zumwalt's High/Low Mix

Finally, there is the 1970s era U.S. Navy attempt at an alternative force structure launched by revolutionary Chief of Naval Operations Admiral Elmo Zumwalt Jr. Like Fisher who faced reduced naval estimates due to the costs of the unpopular Boer War and a rising welfare state, Zumwalt also had to contend with a U.S. naval budget limited by the expenditures for the Vietnam War and for President Johnson's social welfare programs. In response, Zumwalt conceived of a high/low concept for U.S. naval force structure where, in the words of retired naval officer and Hoover Institute scholar Captain Paul Ryan, "A few high-performance ships and many low-performance ones would avoid wrecking the budget but not expose the nation to risks represented by large emerging fleets of small, fast, cruise missile-armed combatants."

Zumwalt's program included reduced funding for large, nuclear aircraft carriers and guided missile escorts, but greater support for a number of low-end vessels including the Sea Control Ship, the patrol frigate (which later became the FFG 7 Perry class frigate), and the Pegasus class hydrofoil combatant. Zumwalt intended that the low-end ships would operate in support of general sea control in low threat areas rather than focus on the Navy's power projection concept developed after the Second World War.

Zumwalt's program found favor with those in Congress who were happy to spend less on the fleet, but met stiff opposition from within the Navy's own ranks, especially from carrier aviators unhappy with reduced investment in carriers. Strategy-minded individuals also opposed the high/low force structure as they felt it failed to appreciate the Navy's vital, carrier-based strike capability as the real war winning capability fielded by the fleet. Naval historian Norman Friedman, for example, labeled high/low as, "An un-Mahanian excursion," and former 6th Fleet Commander Vice Admiral Gerald E. Miller remarked that, "the Sea Control ship might deny the Soviets access to the Chesapeake Bay," but that its effective use ended there.

Zumwalt's low-end ships had faults of their own that were difficult to overcome. In addition to the operational limitations of the Sea Control Ship, the patrol frigate (Perry) class went from a $50 million dollar combatant to an average cost of $193 million dollars by the end of the 51-ship program. The patrol hydrofoils were short-ranged and were focused more toward offensive action than the peacetime patrol and presence operations the Navy required. Estimates on their operating costs vary, but only 6 of the intended 30 were completed with Zumwalt's

successors.

Changes in the strategic situation confronting the U.S. across the 1970s served to bring the high/low alternative force structure to an end by 1980. Intelligence gathered from taps on Soviet Navy underwater communications cables suggested the USSR was not planning a 3rd Battle of the Atlantic where Zumwalt's force would have been most useful. The Communist superpower instead intended to keep its submarines close to the homeland to protect its ballistic missile submarines and attack U.S. carriers threatening Soviet bases. Response to this plan called for more high-end warships such as large aircraft carriers and their escorts. While ultimately not successful, Zumwalt's efforts did lead to better armament for U.S. Navy surface ships such as the Harpoon missile.

Modern Parallels

These case studies suggest that alternative force structures are born from a desire to achieve strategic advantage over an opponent, take advantage of technological advances, and save costs in the execution of strategic policy. Current proposals for alternative force structures follow similar pathways. Concepts for arming a new generation of warships with directed energy weapons and railguns, thereby capturing the high ground of advanced technology, are similar to the U.S. Navy's monitor program of the Civil War. Like the monitors of the 1860s, current designs for railgun and directed energy weapons are in their infancy but potentially very powerful. Initial versions will be expensive and likely to be rapidly outmoded by technological advance.

Proposals for large fleets of smaller, more expendable warships that can be built at low cost mirror the French Jeune Ecole. Those same proposals are also an attempt to build a strategic plan from a tactical or operational concept.

Hybrid warships that combine the capabilities of multiple ships on a common hull, like the U.S. littoral combat ship (LCS) are reminiscent of John Fisher's battlecruisers. Fisher's later entrants into the battlecruiser category later found gainful employment in the Second World War as refitted fast capital ships or as aircraft carriers. The long-term success of the LCS may also depend on its ability to adapt to new missions.

Alternative force structures can also meet challenges from within their host navies. Admiral Zumwalt's high/low mix faced considerable opposition from carrier aviators within the U.S. Navy hierarchy. The low costs with Zumwalt's low-end ships were much greater than first estimated and the strategic situation changed as in past cases making the alternative force structure much less attractive. The U.S. LCS design, conceived as a low- end combatant in a period of lower threats and fiscal austerity, faces similar challenges in ensuring relevance in a new period of Cold War-like peer/near peer competition.

Conclusion

Alternative force structures offer the promise of harnessing new technology, overcoming a specific opponent platform, and cost savings in defense procurement. Naval leaders should be wary in their adoption. Periods of rapid technology as those that occurred in the second half of the 19th century and those occurring in the present can rapidly condemn today's alternative force to an early reserve fleet or scrapyard. High costs incurred in the construction and fielding of a rapidly obsolete alternative force are not easily recouped. Alternative forces inspired by tactical requirements may find themselves at odds with current and future strategies. Finally, even the best alternative force crafted to meet current strategic requirements can be reduced to irrelevance with the stroke of a pen in a diplomatic agreement. Historically, balanced fleets of mixed capabilities have fared better in naval battles and maintained relevance through evolving threat environments. Navies should consider all of these points before embarking on the perilous quest for the perfect alternative force structure.

Steve Wills is a retired surface warfare officer and a PhD candidate in military history at Ohio University. His focus areas are modern U.S. naval and military reorganization efforts and British naval strategy and policy from 1889-1941.

Featured Image: The USS Zumwalt (DDG 1000) is underway for the first time conducting at-sea tests and trials in the Atlantic Ocean Dec. 7, 2015. (U.S. Navy photo courtesy of General Dynamics Bath Iron Works/Released)

Unmanned-Centric Force Structure

By Javier Gonzalez

The U.S. Navy is currently working on a new Fleet Structure Assessment, the results of which will eventually help inform the long-term force structure goals of the Navy's 30-year shipbuilding plan. This ongoing analysis was generated due to the realization that some of the assumptions used to develop the current goal of 308 ships have changed significantly since its proposal in 2014. The Russian resurgence and China's rapid military buildup defied expectations, and a review of the Navy's force structure was absolutely warranted. The conundrum and implied assumption, with this or similar future force structure analyses, is that the Navy must have at least a vague understanding of an uncertain future. However, there is a better way to build a superior and more capable fleet—by continuing to build manned ships based on current and available capabilities while also fully embracing optionality (aka flexibility and adaptability) in unmanned systems. Additionally, and perhaps the better argument, is that a new, unmanned-centric fleet can be more affordable while maintaining its relevance over the expected service life.

Optionality

A relevant fleet is one that is robust, flexible, and adaptable—one that embraces optionality to anticipate uncertain and changing requirements. The author Nassim Taleb describes optionality as "the property of asymmetric upside with correspondingly limited downside." The implication here is to clearly identify which options will provide the best ability to achieve this "asymmetric upside." Systems such as the vertical launch system provide a certain degree of flexibility by allowing for the rapid fielding of any weapons that fit inside a missile. In addition, the concepts of modularity (Littoral Combat Ship program), modular hulls, containers interfaces, flexible infrastructures, and electronic modular enclosures are other examples of the Navy's explicit efforts to add flexibility and adaptability into the fleet. The upsides of adding flexibility are self-evident—by having options added early in the design process, the Navy can quickly and affordably react to new geo-political situations and adjust to technological innovations. However, adding optionality is not an easy proposition, especially because today's capabilities fielding process values optimization, affordability, and a discernable return on investment over adaptability and flexibility.

Optimization is contrary to optionality, but it is a main factor in today's ship design. For instance, space optimization is intuitive—the better optimized a space, given today's capabilities, the smaller the ship needs to be and, consequently, the more affordable it should be. However, this approach infers a level of certainty and inflexibility to change, contrary to optionality. The reality is that optimization is at times necessary on a manned warship. However, new unmanned system designs can provide a canvas to shift this focus to one that values optionality and takes advantage of uncertainty. The

suggestion is to make the long-term investment on the unmanned "bus," not the capabilities. These new unmanned buses must be designed to maximize power generation, cooling, and space availability. The design also needs a robust command and control system to enable the employment of multiple unmanned systems in a cooperative environment.

Affordable Fleet

The affordability of the fleet is not simply a function of budget availability. In 2014, the Chief of Naval Operations, Adm. Jonathan Greenert, testified to Congress that the Navy needed a 450 ship fleet to meet the global demands by the Combatant Commanders. This 450 ship number is likely better equipped to meet future Combatant Commanders' needs than the current proposal of a 308 ship Navy. At a minimum, a 450 ship Navy provides more options to fulfill future requirements. However, the current and expected future fiscal environment suggests that building more ships is not an option unless a radical change occurs. Also, the enemy has a crucial vote on the affordability of the fleet. The fall of the USRR can be traced back to the U.S. strategy, in the 1970s and 1980s, to impose great costs on the Soviets by making investments to render their warfighting systems obsolete. This obsolescence created an incentive for the Soviets to make costly investments in an attempt to match the technology introductions by the United States. This strategy's success was achieved in great part due to the apparent U.S. technological advantage over the Soviets.

Today, the United States finds itself in a similar predicament as the Soviets in the Cold War, where technology is leaping in new and unexpected ways and China, in particular, is fielding systems that make many U.S. systems obsolete. The rapid fielding of "game changing" technology by China, such as the first quantum communications satellite or the DF-21D missile, results in a predictable reaction by the DoD to invest in more capable and expensive advancements to counter their efforts. If the Soviets are any indication of the dangers of this strategy, especially if the United States acknowledges that the technological edge over near competitors in the 20th century will no longer be assured, then the United States needs to shift its competitive model to one flexible enough to rapidly and affordably adjust to unforeseen challenges.

Additionaly, long-term shipbuilding is inherently expensive and dependent on current and mature capabilities. Trying to build a ship with immature technologies can result in unnaceptable acquisition blunders. For instance, the Navy's next-generation nuclear carrier, CVN-78 Gerard P. Ford, has resulted in massive cost overruns due in great part to the risk incurred in trying to include new and immature technologies into the shipbuilding plan. An unmanned-centric fleet provides the flexibility to value building manned ships based on current and available capabilities while also fully embracing optionality in unmanned systems.

An added benefit of having optionality combined with unmanned systems is that it allows for prospective capabilities to be more rapidly prototyped while offering a robust means for experimentation both for technology and future concept of operations development. Unmanned systems could function similarly to a smartphone and its many applications. The benefit of this approach is that it provides an environment with stressors that will allow new technology to fail early and facilitate rapid change, evolution, and dramatically quicken the research and capabilities fielding cycles. The next Fleet Structure Assessment should also embrace optionality by finding the optimal mix of manned and unmanned vessels that will yield an asymmetric upside.

Unmanned-Centric

An unmanned-centric force structure will be dramatically different than today's Navy, and it will require a departure from the 450 ship manned Navy ideal or the current 308 ship goal. The right mix of manned versus unmanned systems can be derived from a concept of operations that promotes judicious force structure discussions. The basis of this new concept is a fleet with more unmanned systems than manned systems where these platforms are fully integrated. For instance, instead of having a Surface Action Group (SAG) comprised of three manned ships, new SAGs could be comprised of a manned ship and at least two unmanned surface vehicles. Incorporating vehicles like DARPA's ASW Continuous Trail Unmanned Vessel or General Dynamics' Fleet-class unmanned surface vessel could add capabilities that will immediately increase lethality and adaptability. In the amphibious realm, the Navy could leverage unmanned platforms as resupply distribution systems for Marines on the beach. This could be of particular

importance in a contested environment while supporting multiple fronts in an archipelago-like scenario. Further in the future, instead of having eleven 100,000-ton aircraft carriers, a mix of eight traditional carriers with eight to ten smaller (~40,000 ton) all-unmanned combat air vehicle carriers will provide the flexibility and presence that all Combatant Commanders are desperately seeking.

Presence is about having the right capability, in the right place, at the right time. To accomplish this the Navy will essentially need more assets. A plausible solution could be a force structure where the main employment of unmanned systems will be around unmanned-centric Surface Action Groups as the smallest force package to fulfill theater needs. The current 308 ship Navy plan is structured as follows:

CVN	LSC	SSC	SSN	SSGN	SSBN
11	88	52	48	0	12

AWS	CLF	SUPT	TOTAL
34	29	34	308

(**CVN** – Carrier, **LSC** – Large Surface Combatants, **SSC** – Small Surface Combatants, **USV** – Unmanned Surface Vessel, **SSN** – Fast attack submarines, **SSBN** – Ballistics Submarines, **AWS** – Amphibious Warfare Ships, **CLF** – Combat Logistic Force, **SUPT** – Support vessels.)

A future force structure could start with trading large and small surface combatants for a new fleet of Unmanned Vessels. The affordability comes from the added presence afforded by the nature of an unmanned autonomous system and the need for fewer personnel to support their operations. The added capability comes from the introduction of 19 capable Surface Action Groups comprised of a manned ship with two unmanned vessels as depicted below:

CVN	LSC	SSC	USV	SSN	SSBN
11	84	50	38	48	12

AWS	CLF	SUPT	TOTAL
34	29	34	340

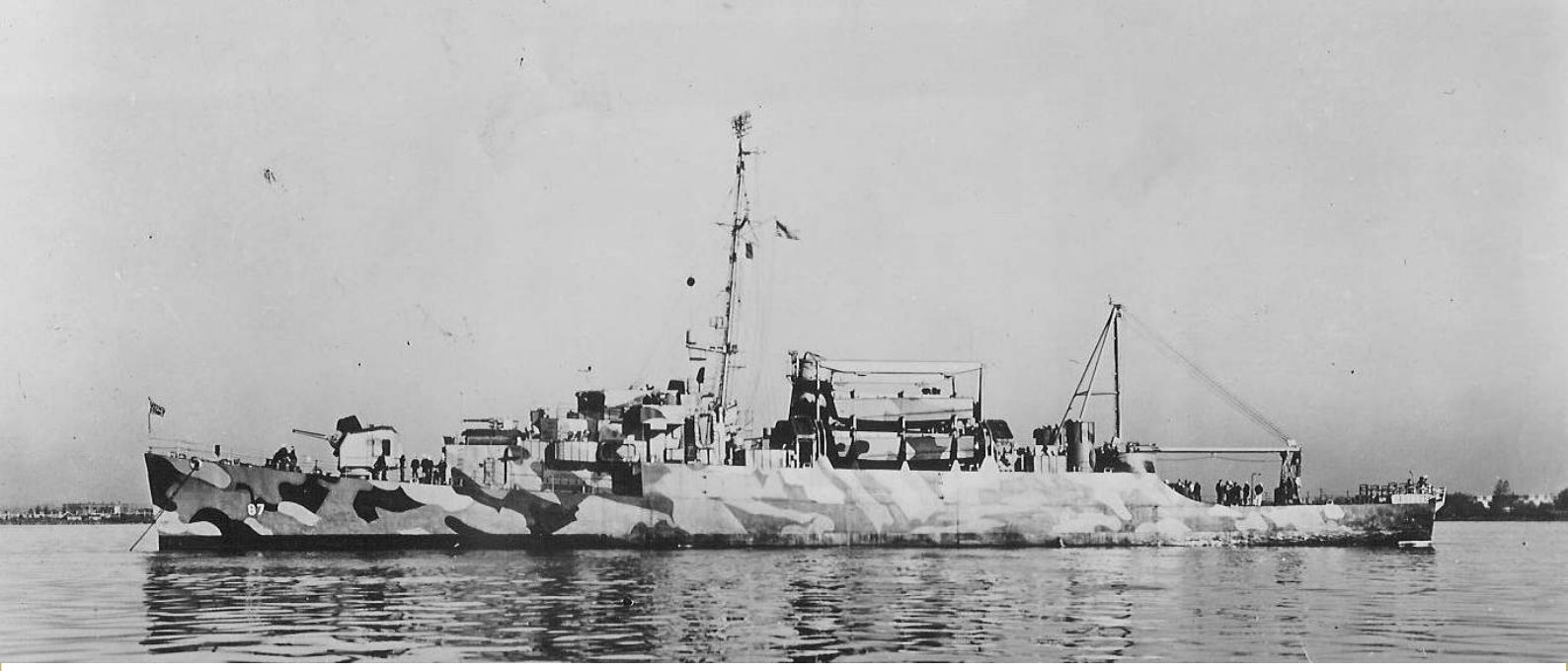
(**CVN** – Carrier, **LSC** – Large Surface Combatants, **SSC** – Small Surface Combatants, **USV** – Unmanned Surface Vessel, **SSN** – Fast attack submarines, **SSBN** – Ballistics Submarines, **AWS** – Amphibious Warfare Ships, **CLF** – Combat Logistic Force, **SUPT** – Support vessels.)

Conclusion

The most important attributes for future force structures are relevance and affordability. This goal can be achieved by pivoting from the traditional to place the emphasis on developing unmanned capable buses that can accommodate all current technologies and have the capacity to flex and adapt to future technologies. Optionality to ship-building and unmanned systems integration can provide the flexibility and adaptability the Navy requires to remain relevant in an uncertain future. The result is a force structure that is more capable and conceptually more affordable. All great plans start with the end in mind – the upcoming Fleet Structure Assessment needs to showcase what the end of the Navy's 30-year vision looks like. The suggestion is an unmanned-centric, man-led fleet.

Commander Javier Gonzalez is a Navy Federal Executive Fellow at the John Hopkins University Applied Physics Laboratory and a career Surface Warfare Officer. These are his personal views and do not reflect those of John Hopkins University or the Department of the Navy.

Featured Image: Rear Adm. Mat Winter, then-chief of naval research, offers remarks during a christening ceremony for Sea Hunter, an entirely new class of unmanned ocean-going vessel during a ceremony held in Portland, Oregon, April 7, 2016. The Defense Advanced Research Projects Agency (DARPA) in conjunction with the Office of Naval Research (ONR) is working to fully test the capabilities of the vessel which is able to travel thousands of miles over the open seas for months at a time without a crew, and with a high degree of autonomy in operation. (U.S. Navy photo by John F. Williams/Released)



Proposing A Modern High Speed Transport – The Long Range Patrol Vessel

By Tom Meyer

The U.S. Navy achieved extraordinary success in the 20th century – playing key roles in winning WWII and the Cold War. The U.S. Navy earned these accomplishments with forces structured around an exceptional fleet of technologically superior ships and aircraft. The U.S. Navy's "ships of the line" during this era represented the height of our technological and industrial capabilities – and no expense was spared to create, construct, and operate this world-leading fleet.

As the United States and the U.S. Navy move into the 21st century, the United States faces the duel challenge of engaging in a "long war" against Islamofacism and meeting the threat of emerging "peer competitors" in a period of economic and fiscal constraints. Meeting these dichotomous challenges requires a fundamental rethink of the nature of naval forces and their roles. Is the U.S. Navy moving from an era of exceptional "ships of the line" – including LHA's & LPD's, FFG's, CG's, DDG's, SSN's and CVN's – to one filled with USV's, UAV's, LCS's, CV's, SSK's and perhaps something new – Long Range Patrol Vessels (LRPV's)? But what exactly is an LRPV?

The LRPV represents the 21st century version of the WWII APD – High Speed Transports. To better understand the 21st century LRPV, let's take a look at the history and capabilities of the 20th century APDs.

Historical Connections

During WWII and the Korean War, Crosley-class APDs based on the Rudderrow class of destroyer escorts were pressed into a variety of roles and performed missions including amphibious assault, UDT operations and raids, ASW, long-range patrolling, and search and rescue– i.e. rescue of USS Indianapolis survivors.

The ability to successfully complete these various missions resulted from the inherently flexible design of the APDs. To begin with, the designers of the Crosley class APD's provided these ships with a strong organic armament, including one 5″/38 dual purpose gun mount, three twin 40 mm gun mounts, six single 20 mm gun mounts, and two depth charge tracks. The Crosley class APD's were equipped to carry and support 12 officers and 150 enlisted men. Furthermore, the Crosley's were equipped with 4 LCVPs to convey troops and equipment ashore.

Finally, the Crosley APD's could carry a combination of the following material on board:

6 x 1/4 ton trucks
2 x 1 ton trucks
4 x ammunition carts
4 x pack howitzers
6,000 cubic feet ammunition
3,500 cubic feet general cargo
1,000 cubic feet gasoline

The capabilities and flexibility of the APD's are the inspiration for a new line of vessels – the Long Range Patrol Vessels (LRPVs).

The LRPV Concept

The modern LRPV would build upon and update the concept of High Speed Transport for the 21st century. The LRPV would combine new technologies, capabilities, and processes to create regionally-focused LRPV surface action groups (SAGs) supporting U.S. national and U.S. Navy strategic goals and objectives.

The modern LRPV would operate as a member of a two ship LRPV sag. The SAG would leverage recent innovative work by the U.S. Marine Corps Warfighting Laboratory to design, create, and test a new Combat Landing Team organizational model – COLT.

The COLT organizational model creates a unique USMC amphibious landing team consisting of three infantry platoons, one weapons platoon, an enhanced scout section, and an enhanced command element.

The specific Concept of Operations (ConOps) would be two LRPVs operating together while jointly carrying one USMC COLT (or U.S. Army equivalent) and their organic vehicles while conducting extended patrols in specific geographic areas (i.e. South America, Africa or SE Asia). These patrols would provide the opportunity for these LRPVs to operate in close, sustained partnerships with local maritime forces by conducting numerous extended joint operations, exercises, and security cooperation engagements.

To meet the challenges emerging in the 21st century, LRPV SAGs would focus on specific geographic regions including South America, Africa, SE Asia, and the Middle East. Forward presence could be enhanced by conducting crew swaps in forward operating locations, including Guam, Japan, Singapore, Diego Garcia, Bahrain, Naples, Guantanamo Bay, and other locations yet to be identified.

Through the use of long-term forward deployments, regionally-based crew-swapping, and the strong organic capabilities of the LRPVs, the specific numeric requirements for the LRPV construction program could be limited to 30-34 individual ships to support regional LRPV squadrons. The number of ships required to support the program is based on a projected need to support at least 4 regionally-focused LRPV SAGs plus their training and maintenance requirements. In addition to carrying a USMC COLT or U.S. Army equivalent formation, the LRPV SAGs could carry a composite unit tailored to suit patrol-specific planned interactions with local national military forces.

For example, the afloat forces for a LRPV SAG deployment to multiple countries over a 6-8 month period within the SOUTHCOM AOR could consist of:

2 platoons of U.S. Army Infantry (plus their Stryker vehicles)
2 platoons of U.S. Army Engineers (and their heavy equipment)
A contingent of U.S. Army Medical personnel
An air contingent of 3-4 UH-60's plus UAV's drawn from U.S. Army Aviation

An anti-piracy patrol off of East Africa could see the LRPV Squadron deploy with:

2 U.S. Coast Guard LEDET detachments plus several container configured as detention facilities
4 CB 90H or 25′ Response boat-small (Defender-Class) or 25′ Transportable Port Security Boat (TPSB) or 23′ Over the horizon (OTH) boat or 23′ USCG Short Range Prosecutor (SRP) (See Small Boat Capabilities in LRPV Characteristics section)
3-4 USCG HH-60 or HH-65 Dolphin helicopters plus several small UAVs

In addition to carrying out these types of long-duration, presence missions, the flexibility of the LRPV design would enable additional missions to be undertaken, including: short term "summer cruises" to support training missions, rapid response to humanitarian crisis, sanctions/blockade enforcement, convoy escort, and search and rescue.

LRPVs would not be amphibious warfare ships per se but are intended to sustain long-range, forward presence patrols supporting U.S. national interests. However, when necessary, LRPV SAGs could conduct counter-terrorism or counter-proliferation raids at the direction of the NCA or could support an ESG by providing additional raiding or striking capabilities during a crisis – thereby increasing the level of difficulty confronting an adversary of the United States. By combining the right mix of technology, capabilities, organizational

structures and sound processes, the LRPV would support key U.S. national interests and provide a visible expression to the concept of a "1000 ship navy" previously expressed by the U.S. Navy and the OSD.

Ship Characteristics

What specific attributes and capabilities would a LRPV have? Here are some key characteristics:

Weight: 7,000-9,000 tons

Length: 450-500ft

Beam: 50-60ft

Draft: 10-16ft

Propulsion: CODAG (minimum 4 LM-2500s or 2 LM-6000s) plus 2 diesel engines – some thought should be given to alternate propulsion systems (i.e. Podded Electric propulsion?) – commercial standards perhaps?

Speed: Max 28 knots (stretch 32 knots) – cruise speed – 14-16 knots (stretch 18-20 knots)

Range: 10,000 NM – Stretch 12,000 at cruising speed

Combat Systems: Aegis SPY-1F(V), (proposed for export-version of LCS) or even the SPY-5 proposed for lighter warships; 2 illuminators (1 fore & 1 aft); CEC-enabled; open architecture networks & C3I systems allow "plug & play" of new weapons and sensors.

ESM/ECM: SQS-32V or newer version

Sonar: Bow-mounted sonar standard; Towed Array – optional

Communications: High-bandwidth satellite communications

Crew:

140-180 (190 is acceptable)
Additional berthing (permanently installed): 120 Marine (1/2 of USMC COLT insert link)
Additional crew considerations: SOF, humanitarian personnel, noncombatant evacuation, search and rescue.

Weapons

Guns:

1×5" Gun
2x25MM Remote EO-controlled mounts
4-6 .50cal manned weapons – as operationally required

Missiles:

1 Mk 41 VLS system with 48 launch tubes (or 2×24) which could include:
24 Standard Mk 2/3 SAM's
6 Harpoons
6 VLA (Vertical Launch ASROC's)
48 ESSMs (12×4)
Use of VLS enables the introduction of new missiles over the life of the LRPV.

ASW Torpedoes: 2×2 Mk 32 Mod 9 mounts

Aircraft:

Landing Spots: Operation of 2 helicopters simultaneously (4 would be a stretch goal)
Hangar Space: 4 medium helicopters (SH-60's specifically 2 SH-60R & 2 SH-60S). Ability to provide hangar space for 3 SH-60 size helicopters plus 2 additional Fire Scouts would be a stretch goal

Flex Deck:

Square Footage: 16,800 Sq Feet per ship
Weight Capacity: Reinforced to support up to M1A2 tank (Up to 70 Tons)
Suggested vehicle load across two LRPVs could include a reinforced Light Armored Reconnaissance Platoon (or comparable U.S. Army Stryker unit):

8 LAV-25's/M-1126 Strykers
2 LAV/R or M-1132,
2 LAV-C or M-1130, 2 LAV/M or M-1129
2 LAV(TOW Launcher) or 2 M-1134 Stryker Anti-Tank Guide Missile Vehicle
14 Humvees
14 10 5-7 Ton FMTV's including 2-3 Tankers
3 155MM Towed Artillery Guns plus Movers (Stretch)
6 Additional 40' Containers – Supplies & Training Simulators

Notes on Flex Deck:

Flight deck access would be ideal with either ramp or elevator (Ramp is preferred due to simplicity)
Ability to load LCM or LCVP via 30 ton crane is required
Ro/Ro capability is required (via a ramp or a mexeflote style ramp at stern and ramp to port or starboard) – with 100 ton carrying capacity
Flex deck must support the installation of

habitability containers to support additional troops or temporary medical facilities
Flex deck must provide electrical and communication network interfaces across entire flex deck floor space – both high-speed direct connectivity and wireless connection

Small boat capabilities:

2 x LCM-6s – LCM would be able to carry 25 tonnes (30 tonnes stretch goal) – this will enable carriage of LAVs or Strykers
2 x LCVPs or 2 x DOCKSTAVARVET AB CB90Hs – Carried in separate davits from LCM-6s
Note: The LCVPs must be capable of carrying Uparmored Humvees, an example of a possible LCVP which could be used is the Royal Navy LCVP Mk5. The Mk5 is 15.5 meters long and 4.4 meters wide and capable of carrying a company of 30 fully equipped troops or vehicles such as: BV206, JCB410, ATV's and towed artillery. The Mk5 can travel up to 25 knots and has a range of over 210 nautical miles.

Note: LCM davits must be flexible enough to support LCVPs, RHIBs, CB 90Hs, CSSCs or USCG small craft. LCVP davits must be flexible enough to accommodate RIB's, CH 90Hs, CSSCs or USCG small craft.

2 x RHIBs – Standard ship's complement – separate from landing craft listed above.

Additional capabilities:

Excess fresh water production capacity
Strong organic, on-board medical facilities
Excess toilet and showering facilities to support combined baseline ship complement, USMC/U.S. Army/other additional complement plus additional personnel house in habability containers on flex deck
Onboard synthetic training facilities for COLT team members including infantry & tankers (Perhaps 2×20 or 40 foot containers configured to provide simulation facilities on Flex Deck)

With a lifelong interest in aviation, naval and all manner of military affairs, Tom Meyer graduated from Florida State University with a BA in Political Science & International Relations and an MS in Political Science. He spent over a decade with Top 3 US Airline working in Ops, Technology, the Low Cost Carrier unit and Employee Relations. Tom has now worked almost 10 years for a major Telecommunications company in various roles. Home is Atlanta, GA. You can follow Tom on Twitter at @tkmeyer0524.

Featured Image: USS Crosley (APD-87) anchored off Philadelphia Navy Yard, 30 October 1944. US Naval History and Heritage Command photo #NH 91584. Courtesy of A.D. Baker III.

No Time To Spare: Drawing on History to Inspire Capability Innovation in Today's Navy

By Bob Hein

Imagine a day sometime in the near future where tensions between the United States and Russia are high and ships are at sea, ready to strike each other at a moment's notice if given the word. As his ship glides to the surface of the ocean, the enemy submarine commander raises his periscope and with it the electronic surveillance antennae. It picks up multiple signals of U.S. aircraft in the immediate vicinity. But the commander is not worried. These aircraft, their radar, and their weapons are optimized for attacks against land targets; they won't see his periscope, and even if they did, they wouldn't have the weapons to do much about it. As long as he can avoid U.S. ships and submarines, which are spread out and in short supply, he knows he and his comrades have the upper hand in gaining control of the sea. As he leaves the surface, he works unimpeded toward his target, the American aircraft carrier.

At the same time, hundreds of miles away, a U.S. submarine commander is moving toward the enemy's surface action group. He knows if he can get close enough and sink these ships, he can help ensure control of the sea for the rest of the force. Suddenly, the sound of weapons dropped from enemy helicopters fills the ship. He runs deep and aggressively, maneuvering to negate the threat. But in doing so, he loses contact with the group. And without an ability to shoot the helicopter, he misses an opportunity to take down an archer, who will now be able to shoot future arrows at him and his compatriots.

Ten years ago, this scenario would have been a work of pure fiction, unimaginable to most national security experts and military leaders. But today, the rapid spread of technology, the rise of near peer competitors, and the proliferation of advanced weapons make this scenario more plausible than ever. If the Navy is to counter the above scenario, it must start emphasizing sea control while retaining power projection capability. That change will require the Navy to accelerate its approach to this mission set, both in strategic terms of shifting mental focus and in more tactical terms of rapid repurposing of current platforms and payloads. While the Navy works to determine its future force structure, it must innovate beyond the traditional roles that ships and aircraft currently play. Designing and building new naval platforms takes time we don't have, and there is still abundant opportunity to make the most of existing force structure. Fortunately for the Navy, histories of previous wars are a good guide for future action. World War II is an excellent model in particular, but the Navy must first recognize the historical context of its current predicament.

Bringing the Navy Back to the Sea

Alfred Thayer Mahan wrote extensively on how nations throughout history have used

control of the seas to spread national power by ensuring freedom of trade and access. Over the course of the last century, the Navy's primary focus of force application has shifted from sea control to power projection.

Arguably, the battle for control of the seas culminated in WWII, when massive navy-on-navy engagements raged in enormous clashes such as the Battles of the Atlantic, Midway, and Leyte Gulf. Navy strike groups were challenged by Axis Powers throughout the world's oceans.

Following WWII, the U.S. had a massive navy and no real threat to its control of the oceans. The Navy and the nation were now unsure of the Navy's role in this new world. The Navy received assistance from a 27-year-old theorist, Samuel Huntington. Writing in 1954, he had a clear vision for how the Navy should evolve in the second half of the 20th century: "Its purpose is not to acquire command of the sea, but rather to utilize its command of the sea to achieve supremacy of the land." The Navy began shifting its focus to power projection, refining amphibious warfare techniques, developing a long range land attack missile, and building generations of air wings capable of delivering ordnance ashore. Even so, as the Cold War intensified and the Soviet Navy grew throughout the 50's and 60's, this focus ashore was balanced by the continuing requirement of maintaining control afloat.

Following the end of the Cold War and the dissolution of the Soviet Navy, the U.S. Navy's focus on sea control diminished and the pendulum swung squarely over to power projection. Anti-surface missiles were removed from ships, Trident missile submarines were converted to fire Tomahawks, and the carrier's S-3 Viking anti-submarine aircraft were stripped of much of their anti-submarine warfare gear and were later retired. Major force structure investments were made in ships geared towards littoral power projection such as the LCS and Zumwalt-class destroyer. Generations of Sailors during the Cold War were trained to achieve sea control – it was part of their DNA. When the Cold War ended, and with it the Soviet Navy, that DNA withered away.

As Bob Dylan tells us, once again, the times they are a changin'. The world is returning to a period of great power competition, and other nations' desire to influence the world stage is forcing the Navy to rethink its focus. In the coming decades, the U.S. Navy may not have its current luxury of safely traversing the world's oceans and projecting power. The rise of foreign capability could threaten carrier strike groups when they leave their harbors. The Navy must expand its focus from the last 25 years of projecting power, and strengthen its historic mission of sea control.

Make the Old New Again

When trying to convert this shift in focus to the platforms that will execute sea control, it is time to heed the old dictum, "If you want a new idea, read an old book." Just as the Navy had to do in WWII, it is time to focus on repurposing platforms it already has rather than relying on new platforms.

Looking back to its height of sea control capability, the Battle of Midway in WWII, carrier air wings (at the time known as carrier air groups) consisted of about 72 aircraft, one squadron each of dive bombers, fighters, torpedo bombers, and scout planes (which could also carry bombs). Compare that with today's air wing. While the number of aircraft is about the same, its composition has changed dramatically, with four fighter/attack squadrons, one electronic attack squadron, one command and control squadron, and two helicopter squadrons. The biggest difference is the shift in focus of the air wing from fighting other navies for control of the seas to a focus on delivering power ashore.

At over 40 years old, the USS Nimitz is the oldest carrier in the U.S. inventory. The reason she has survived is due to upgrades to her air wing. There is debate currently over whether the Nimitz, and follow on carriers are still valid in a world of anti-access and area denial. This debate centers on the Navy's role in power projection but speaks little to its return to sea control. While the carriers are still the best platform for delivering power without the need for foreign basing permissions, adding an anti-submarine and anti-surface role to its newest fighters is necessary. Similar to efforts by the surface warfare community to modify the SM-6 anti-air missile for strikes against ships, the Navy should modify those ASW and ASUW weapons currently used by the MH-60R helicopter for use by its fighter-attack jets. Just as in WWII, not all aircraft would be configured for surface or subsurface missions, but providing that latent capability will certainly ensure enemy ships and subs will think twice when they see the radar signature of a U.S. fighter.

Submarines are very effective at what they do – sinking other submarines and attacking surface ships – but many potential adversaries have fleets of helicopters designed to hunt them. Simply giving subs a basic anti-air warfare capability against these platforms would certainly give adversaries cause for concern. This system already exists in the German Navy. The Interactive Defense and Attack System for Submarines (IDAS) is currently being built for the German Type 212 submarine. With a 12-mile range, it will certainly make helicopters think twice as they drop their buoy search patterns. Submarine attacks against aircraft are not a new concept. In WWII, 120 Allied aircraft were shot down by German U-Boats.

Military Sealift Command (MSC) is experiencing great success in expanding the role of its fleet, and has been a leader in creatively repurposing existing platforms. MSC has added intelligence, surveillance and reconnaissance, and command and control capabilities to platforms such as the Expeditionary Fast Transport (formerly Joint High Speed Vessel) and the dry-cargo/ammunition ships (T-AKE). Marine Forces Pacific has experimented with the T-AKE extensively, using the ship for low-end operations, and even as a potential command and control platform. The MSC has shown there is a lot of opportunity in our current fleet. We just have to be creative.

Conclusion

As the challenges on the world's oceans continue to rise, the challenge of sea control rises with them. With rapid repurposing of various platforms and payloads, the Navy can quickly adapt and overcome if and when required to fight and win this nation's wars. By looking back at history, sometimes we can find the tools for the future.

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Featured Image: A U.S. Navy Lockheed S-3A Viking aircraft (BuNo 159755) assigned to anti-submarine squadron VS-32Maulers on the aircraft carrier USS America (CV-66), on 6 May 1982. (W. M. Welch, USN)

Enhancing Existing Force Structure by Optimizing Maritime Service Specialization

By Eric Beaty

The factors which color our view of the world have changed significantly since the end of the Cold War. That overarching conflict polarized the world's politics and drove the United States to build a naval force focused on blue-water combat against a peer competitor, but the demise of the Soviet Union left a much more complex world where the United States must be prepared to simultaneously counter myriad threats at multiple levels. There is not a uniform solution to every problem and there is not a uniform fleet for every theater. Luckily, the United States has three maritime services—the Navy, Coast Guard, and Marine Corps—with different core competencies covering a broad range of naval missions. Current investments in force structure can be maximized by focusing the maritime services on their preferred missions.

Some missions have historically been assigned according to service and platform, rather than warfare areas, which has led to small, orphaned communities in some services. These communities are too small to have many high-ranking alumni in overall service leadership. The resulting consequences include them being often misunderstood and undervalued, poor funding, poor career opportunities, few if any champions in service leadership, and so on. Even when they are appreciated and funded, niche communities lack economies of scale. Therefore, the way to ensure missions are properly funded and manned is to task an interested party to advocate for them, and each of the maritime services has missions they are most passionate about.

The naval force of the future would see a Navy endorsement of the territorial patrol missions of the Coast Guard and expanding the role of the Navy-Marine Corps amphibious team, but there would be no radical course corrections. Instead, naval missions would be assigned to "centers of excellence" within the services to manage the organization, training, and tactics of the joint forces which would execute such missions.

Navy – Combat on the High Seas

The U.S. Navy would manage the missions of blue-water combat: submarine and antisubmarine warfare, carrier aviation, surface warfare, air defense, and sealift. These missions are already clearly within the Navy aegis, so there would be no major change in their execution. By focusing on these core mission sets, and shedding the remainder which the Navy has been unenthusiastic about, the leadership would be refocused on areas where Navy doctrine, tactics, and procurement have been most refined. As such, the platforms of the blue-water Navy would not deviate much from their present and planned configurations.

Coast Guard – Patrolling Offshore

The U.S. Coast Guard would be the mission

manager for coastal and offshore patrol operations, for both law enforcement and maritime safety. Under the umbrella of muscular law enforcement, the Coast Guard would manage not only patrols of the American coast, but also patrols off South America and Africa as well. Most of these vessels would be frigates, both U.S. Navy and allied, rather than white-hull Coast Guard cutters, but all would be dedicated to low-intensity constabulary missions. By keeping the peace along much of the world's coastline, the Coast Guard-led maritime patrol enterprise would free up high-capability vessels to deter peer competitors.

The worldwide maritime patrol enterprise would be led by the United States, with the nonjudgmental aim of maintaining the world's seaways under the control of accepted and functional governments, because even reticent governments make easier negotiating partners than ungoverned chaos. The simplest way to lead such an enterprise is to help equip and train it, so the United States Navy and Coast Guard would have extensive foreign military sales, partnership programs, and personnel exchange programs with allied maritime nations.

To make such a broad endeavor more practical, the Coast Guard's offshore cutters, the Navy's patrol frigates, and allied nations' warships would need to be common. The principal requirements would be low cost, ease of maintenance, and margins for growth. The basic warship would have a simple power plant, enough systems to operate as a minimalist patrol ship, and substantial space and weight left available for additions. Buyers could add additional fuel tanks and provisions storage, a variety of weapons, helicopter or boat facilities, or a host of other standardized modifications. While these frigates would be too small to add all options to every vessel, they would also be inexpensive enough that customers of modest means could still purchase them, and customers like the United States could purchase lots of them.

Built cheaply and in large numbers, flotillas of these semi-modular ships would patrol for pirates off Africa, drug smugglers in the Gulf of Mexico, or vessels in distress off North America. For patrol locations far from suitable ports, the Navy would reawaken the concept of tender vessels; using replenishment ships to establish at-sea bases to extend the on-station time of frigates and cutters. These tenders would provide fuel, provisions, spare parts, and a base for the flotilla's command element. By performing lower-threat missions economically, these frigates would free up the destroyers, cruisers, and carriers to concentrate in high-threat theaters, thereby maximizing combat power.

Marine Corps – Seizing the Littorals

While the Navy prepares to fight wars on the high seas and the Coast Guard leads patrol efforts in more stable theaters, the Marine Corps would manage naval missions across coastal seas and coastal lands. As the service tasked with crossing from sea to land, the Marine Corps is concerned with anything which could affect or impede an amphibious action, including the obvious amphibious tasks, but should now focus on missions like mine countermeasures and small boat operations. Afloat Marine forces are carried to battle by Navy amphibious assault ships and delivered to the beach by Navy landing craft, so there would remain a substantial Navy influence in certain elements, but the Marines would be the lead advocates for coastal mission capabilities.

Navy destroyers, cruisers, and carrier battle groups would be responsible for clearing a path to the coastal area for the amphibious train, but the amphibious ships and their direct escorts would be responsible for fighting their way to the beach and enabling the landing force to cross it. To defeat small boat threats and provide fire support until the Marine landing force could establish artillery ashore, the amphibious train would be escorted by frigates (based on the common hull introduced above) specialized with the maximum number of naval guns possible. With these frigates, the amphibious force would be able to defeat enemy forces in waters too constricted for the blue-water warships to operate effectively.

Closer to the beach, mines would be the next threat to an amphibious landing. Rather than operate a separate fleet of minesweepers and mine countermeasures support ships, the Marine Corps-centered littoral force would base countermine detachments aboard the same amphibious assault ships carrying the landing force. Assault ships are designed with large well decks, copious storage, and substantial berthing space, making them best-suited to operate divers and unmanned countermine vehicles of all sizes. Furthermore, they have the flight decks to operate the CH-53K King Stallions that would take the airborne

minesweeping mission from the Navy's MH-53E Sea Dragons as these aging helicopters are retired. Saving the Navy the purchase of new mine countermeasures ships would pay off in funding for extra amphibious landing ships and CH-53Ks, a doubly effective reorganization for the amphibious mission.

The Marine Corps would also take overall responsibility for the related riverine mission set. Outside of port security missions (which would fall under Coast Guard leadership), all coastal and riverine boat operations would become part of the permanent Navy-Marine Corps amphibious enterprise. Effective riverine operations include the same elements as amphibious landings—afloat mobility, fire support, and power projection ashore—so consolidation of the riverine and amphibious communities would create a deeper and more diverse base of experience for both missions. Integration with Marine Corps infantry, aviation, and artillery would make the riverine squadrons more effective in combat than they could be alone. Also, increased small-boat landing and raiding capability would increase the Marines' naval presence and take advantage of their unique maritime capabilities.

The Joint Naval Force in Action

This joint naval force of the future would perform in a very similar fashion to the present-day and historical naval forces, insofar as the various forces have capabilities available. Where the future naval force would excel is in peacetime administration and presence: more efficient management of missions would reduce redundancy and increase the number of forces available when and where they were needed for combat and deterrence. Transitory advantages like technology or brilliant leadership would come and go, but the future naval force would be organized to make the most efficient use of these advantages on the seas to achieve America's long-term goals.

LT Eric Beaty is an E-2C/D Hawkeye Naval Flight Officer, presently working ashore in D.C. The views express herein are solely those of the author and are presented in a personal capacity on his own initiative. They do not reflect the official positions of the Department of Defense.

Featured Image: PACIFIC OCEAN (July 18, 2016) - Cpl. Ryan Dills communicates with other assault amphibious vehicles while traveling from amphibious assault ship USS America (LHA 6) to Royal Australian Navy Canberra class amphibious ship HMAS Canberra (L02). (U.S. Marine Corps photo by SSgt. Christopher Giannetti/Released)

Augment Naval Force Structure By Upgunning The Coast Guard

By Chuck Hill

The Navy has been talking a lot about distributed lethality lately, and "if it floats, it fights." There is even talk of mounting cruise missiles on Military Sealift Command (MSC) ships, even though it might compromise their primary mission. But so far there has been little or no discussion of extending this initiative to include the Coast Guard. The Navy should consider investing high-end warfighting capability in the Coast Guard to augment existing force structure and provide a force multiplier in times of conflict. A more capable Coast Guard will also be better able to defend the nation from asymmetrical threats.

Why Include the Coast Guard?

A future conflict may not be limited to a single adversary. We may be fighting another world war, against a coalition, perhaps both China and Russia, with possible side shows in Africa, the Near East, South Asia, and/or Latin America. If so, we are going to need numbers. The Navy has quality, but it does not have numbers. Count all the Navy CGs, DDGs, LCSs, PCs and PBs and other patrol boats and it totals a little over a hundred. The Coast Guard currently has over 40 patrol ships over 1,000 tons and over 110 patrol craft. The current modernization program of record will provide at least 33 large cutters, and 58 patrol craft of 353 tons, in addition to 73 patrol boats of 91 tons currently in the fleet, a total of 164 units. Very few of our allies have a fleet of similar size.

Coast Guard vessels routinely operate with U.S. Navy vessels. The ships have common equipment and their crews share common training. The U.S. Navy has no closer ally. Because of their extremely long range, cutters can operate for extended periods in remote theaters where there are few or even no underway replenishment assets. The Coast Guard also operates in places the USN does not. For example, how often do Navy surface ships go into the Arctic? The Coast Guard operates there routinely. Virtually all U.S. vessels operating with the Fourth Fleet are Coast Guard. There are also no U.S. Navy surface warships home based north of the Chesapeake Bay in the Atlantic, none between San Diego and Puget Sound in the Pacific, and none in the Gulf of Mexico with the exception of mine warfare ships.

In the initial phase of a conflict, there will be a need to round-up all the adversaries' merchant ships and keep them from doing mischief. Otherwise they might lay mines, scout for or resupply submarines, put agents ashore, or even launch cruise missiles from containers. This is not the kind of work we want DDGs doing. It is exactly the type of work appropriate for Coast Guard cutters. Coast Guard ships enjoy a relatively low profile. Unlike a Carrier Strike Group or Navy SAG, they are less likely to be tracked

by an adversary.

If we fight China in ten to twenty years, the conflict will likely open with China enjoying local superiority in the Western Pacific and perhaps in the Pacific in general. If we fight both China and Russia it may be too close to call.

Coast Guard Platforms

National Security Cutter (NSC)

This class of at least nine and possibly ten, 418 foot long, CODAG powered, 28 knot ships, at 4,500 tons full load, are slightly larger than Perry-class frigates. Additionally, they have a 12,000 nautical mile cruising range. As built they are already equipped with:

- Navy certified helicopter facilities and hangar space to support two H-60 helicopters
- A 57 mm Mk110 gun
- SPQ-9B Fire Control Radar
- Phalanx 20mm Close in Weapon System (CIWS)
- 2 SRBOC/ 2 x NULKA countermeasures chaff/rapid decoy launcher
- AN/SLQ-32 Electronic Warfare System
- EADS 3D TRS-16 AN/SPS-75 Air Search Radar
- A combat system that uses Aegis Baseline 9 software
- A Sensitive Compartmented Intelligence Facility (SCIF)

In short, they are already equipped with virtually everything needed for a missile armed combatant except the specific missile related equipment. They are in many respects superior to the Littoral Combat Ships. Adding Cooperative Engagement Capability might even allow a Mk41 equipped cutter to effectively launch Standard missiles targeted by a third party.

The ships were designed to accept 12 Mk56 VLS which launch only the Evolved Sea Sparrow missiles (ESSM). Additionally, the builder, Huntington Ingalls, has shown versions of the class equipped with eight Mk41 VLS (located between the gun and superstructure) plus eight Harpoon, and Mk32 torpedo tubes (located on the stern). Adding missiles to the existing hulls should not be too difficult.

The Mk41 VLS are more flexible in that they can accommodate cruise missiles, rocket boosted antisubmarine torpedoes (ASROC), Standard missiles, or Evolved Sea Sparrow missiles (ESSM). Using the Mk41 VLS would allow a mix of cruise missiles and ESSM with four ESSMs replacing each cruise missile, for example eight cells could contain four cruise missiles and 16 ESSM, since ESSM can be "quad packed" by placing four missiles in each cell. Development of an active homing ESSM is expected to obviate the need for illuminating radars that are required for the semi-active homing missiles. Still, simpler deck mounted launchers might actually offer some advantages, in addition to their lower installation cost, at least in peacetime.

Cutters often visit ports where the population is sensitive to a history of U.S. interference in their internal affairs. In some cases, Coast Guard cutters are welcome, while U.S. Navy ships are not. For this reason, we might want to make it easy for even a casual observer to know that the cutter is not armed with powerful offensive weapons. Deck mounted launchers can provide this assurance, in that it is immediately obvious if missile canisters are, or are not, mounted. The pictures below show potential VLS to be considered.

Offshore Patrol Cutter (OPC)

The OPC program of record provides for 25 of these ships. A contract has been awarded to Eastern Shipbuilding Group for detail design and construction of the first ship, with options for eight more. The notional design is 360 feet long, with a beam of 54 feet and a draft of 17 feet. The OPCs will have a sustained speed of 22.5 knots, a range of 10,200 nautical miles (at 14 knots), and an endurance of 60 days. Its hangar will accommodate one MH-60 or an MH-65 and an Unmanned Air System (UAS).

It will have a space for a SCIF but it is not expected to be initially installed. As built, it will have a Mk38 stabilized 25 mm gun in lieu of the Phalanx carried by the NSC. Otherwise, the Offshore Patrol Cutter will be equipped similarly to the National Security Cutter. It will likely have the same Lockheed Martin COMBATSS-21 combat management system as the LCS derived frigates. They could be fitted with cruise missiles and possibly Mk56 VLS for ESSM as well. These ships will be ice strengthened, taking surface launched cruise missiles into the Arctic.

Fast Response Cutter (FRC)

The FRC program of record is to build 58 of these 158 foot, 28 knot, 365 ton vessels. 19

have been delivered and they are being built at a rate of four to six per year. All 58 are now either built, building, contracted, or optioned. They are essentially the same displacement as the Cyclone class PCs albeit a little slower, but with better seakeeping and a longer range. Even these small ships have a range of 2,950 nm. They are armed with Mk 38 mod2 25 mm guns and four .50 caliber M2 machine guns.

They are already better equipped than the Coast Guard 82 foot patrol boats that were used for interdiction of covert coastal traffic during the Vietnam War. If they were to be used to enforce a blockade against larger vessels, they would need weapons that could effectively stop medium to large vessels.

Marine Protector Class

There are 73 of these 87 foot, 91 ton, 26 knot patrol boats. Four were funded by the Navy and provide force protection services for submarines transiting on the surface in and out of King Bay, GA and Bangor, WA.

If use of these vessels for force protection were to be expanded to a more hostile environment, they would likely need more than the two .50 caliber M2 machine guns currently carried. The four currently assigned to force protection units are currently equipped with an additional stabilized remote weapon station.

Weapons

Cruise Missiles

The U.S. Navy currently has or is considering four different surface launched cruise missiles: Harpoon, Naval Strike Missile (NSM), Long Range Anti-Ship Missile (LRASM), and Tomahawk. Of these, LRASM appears most promising for Coast Guard use. Tomahawk is the largest of the four and both Harpoon and NSM would be workable, but they do not have the range of LRASM. The intelligence and range claimed for the LRASM not only makes it deadlier in wartime, it also means only a couple of these missiles on each of the Coast Guard's largest cutters would allow the Coast Guard's small but widely distributed force to rapidly and effectively respond to asymmetric threats over virtually the entire U.S. coast as well as compliment the U.S. Navy's efforts to complicate the calculus of a near-peer adversary abroad.

Small Precision Guided Weapons

It is not unlikely that Fast Response Cutters will replace the six 110 foot patrol boats currently based in Bahrain. If cutters are to be placed in an area where they face a swarming threat they will need the same types of weapons carried or planned for Navy combatants to address this threat. These might include the Sea Griffin used on Navy's Cyclone-class PCs or Longbow Hellfires planned for the LCS.

Additionally, a small number of these missiles on Coast Guard patrol craft would enhance their ability to deal with small, fast, highly maneuverable threats along the U.S. coast and elsewhere.

Light Weight Anti-Surface Torpedoes

If Coast Guard units, particularly smaller ones, were required to forcibly stop potentially hostile merchant ships for the purposes of a blockade, quarantine, embargo, etc. they would need something more than the guns currently installed.

The U.S. does not currently have a light weight anti-surface torpedo capable of targeting a ship's propellers, but with Elon Musk building a battery factory that will double the worlds current capacity and cars that accelerate faster than Ferraris, building a modern electric small anti-surface torpedo should be easy and relatively inexpensive.

Assuming they have the same attributes of ASW torpedoes, at about 500 pounds these weapons take up relatively little space. Such a torpedo would also allow small Coast Guard units to remain relevant against a variety of threats.

Conclusion

Adding cruise missiles to the Coast Guard National Security Cutters and Offshore Patrol Cutters would increase the number of cruise missile-equipped U.S .surface ships by about 40 percent.

Coast Guard Patrol craft (WPCs) and patrol boats (WPBs) significantly outnumber their Navy counterparts. They could significantly increase the capability to deal with interdiction of covert coastal traffic, act as a force multiplier in conventional conflict, and allow larger USN ships to focus on high-end threats provided they are properly equipped to deal with the threats. More effective, longer ranged, and particularly more precise

weapons could also improve the Coast Guard's ability to do its homeland security mission.

Thanks to OS2 Michael A. Milburn for starting the conversation that lead to this article.

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Featured Image: Photo: The U.S. Coast Guard high endurance cutter USCGC Mellon (WHEC-717) launching a RGM-84 Harpoon missile during tests off Oxnard, California (USA), in January 1990. by PAC Ken Freeze, USCG

A Fleet Plan for 2045: The Navy the U.S. Ought to be Building

By Jan Musil

Rather than the usual discussion of what the U.S. Navy has and how to get Congress to fund more and better ships and systems, this article concentrates on the fleet we ought to be constructing in the decades ahead. 2045 is a useful target date, as there will be very few of our Cold War era ships left by then, therefore that fleet will reflect what we are building today and will build in the future. This article proposes several new ship designs and highlights enduring challenges posed by the threat environment.

A New Transoceanic Frigate Design

The retirement of the Oliver Hazard Perry-class frigates has left a substantial hole, both in terms of surface ship numbers and ASW capability in the U.S. Navy's warfighting capabilities. This is an understandable move on our part given recent budget pressures, but this author is convinced we are going to have to replace the transoceanic escort and ASW capability the class provided to the fleet.

Perry Replacement

Building a class of frigates that are 21st century versions of the Perry class is an obvious alternative for us to consider. I suggest designing a slightly larger version, say 3800 tons, with a fighting ability heavily focused on the ASW mission. Since the Navy is building plenty of littoral capability in the various LCS classes, this new design should be expressly built to operate effectively in the high sea states the North Atlantic and North Pacific are notorious for generating at regular intervals.

Using the larger turbine engine already in use with the LCS in the new design is expensive, both in construction and operating costs, but not so much more that it makes sense to retain two support and maintenance trails in the fleet and shipyards. Yes, the extra speed will be nice, but in reality is not really necessary. But with the larger engine already baked into the Navy's operating budget it is better to stick with it even if the operating advantages of more speed in deep blue waters are marginal.

Foremost is the wider beam the bigger turbine will force on the designers. Make a virtue of this fact by making the focus of the new frigate design its helicopter deck, hanger, assigned Seahawk, two Fire Scouts, and ten to twelve TFS buoys. This ship class will exist to provide ASW escort to the CSGs, ARGs and transoceanic convoys operating in the deep blue.

There will be a 5″ gun to put aboard, the basics of AAW self-defense and plenty of VLS capability for ASW, AAW and the developing distributed long-range strike abilities the Navy has decided it requires. Other than those modifications, this ship exists primarily to screen against and/or hunt submarines.

Those concerned over such a design's lack of more substantial AAW and offensive capabilities should understand the same argument used to defend the purchase of the original Perrys. Neither the Navy nor the nation can afford to put all three capabilities in substantial measure aboard this small ship build. We couldn't afford it with a fifty-six ship build against the Soviet Union and we cannot afford it with the thirty plus frigates we need to build of this new design in the decades ahead.

Hull Design Opportunity

This author shares in the lack of enthusiasm for the use of aluminum in the hulls of the Independence class. But the potential capabilities of the trimaran portion of that class's design are intriguing.

Whether made of steel or the still-to-be-proven aluminum, a trimaran hull properly designed could provide substantial improvements in stability for helicopter operations in high sea states.

Traditionally Mediterranean navies, the Italians in particular, turned to trimaran designs for speed to use against heavier gunned opponents. With the U.S. Navy, speed is never going to be first on a skippers mind in heavily rolling waters, but safely operating the ships ASW equipment, helicopters, and buoys, frequently will be.

So let's take the time in the design phase to see what can be designed into the new class by utilizing a wide beam trimaran design, possibly a few more missile tubes and AAW assets can be squeezed in topside if the extra beam is available forward of the hangar deck, even if merely above the waterline. Finally, the offshore oil industry has had some recent success reducing instability in their workboats by moving the bridge all the way forward to the very front of the ship. The result is a vertical, or nearly vertical bow topside with the amidships area given over to work, or in the Navy's case, fighting space.

This frigate should cost the taxpayers under 400 million dollars, probably well under that figure, making the construction of thirty plus ships over the years ahead an affordable investment for the Navy in both the number of ships and our ASW fighting capabilities.

A Flexible New Cruiser Design

In the decade ahead, the U.S. Navy is facing the need to extend and eventually replace the Ticonderoga class CGs now in service. We should look to a flexible new cruiser design that can be adapted for varying purposes through the mid-21st century.

By using a basic class design incorporating the same propulsion plant installed across various adopted designs we will generate very substantial lifetime cost savings. Additional lifetime savings can be gained by using the same bow and forecastle steel framework across the ship classes. A third, smaller, but still meaningful set of savings can be derived from using the same bridge and AAW working spaces layout. This will provide a great deal of flexibility in what types of guns, radars, VLS loadouts, helicopter deck and hangar layout details are selected to serve the purposes of a particular cruiser class.

Size

To meet the substantial electrical power needs of the fleet of the future, energize a single railgun if installed, provide plenty of length and beam for the radars of today and tomorrow, enough space to house computers and operators and adequate AAW warfare capability, something from 15,000 to 20,0000 tons is needed. Since every ton added adds significant construction and maintenance costs, this author suggests considering a 17,000 ton modern version of the Baltimore-class cruisers built during WW2. Utilizing a proven sea going design like the Baltimore's for a proven bow and forecastle design for all of the cruiser classes will provide a cost effective way of providing ships with good sea keeping abilities, with fewer design-from-scratch headaches and lower lifetime costs.

Engine Room

A non-nuclear electric power system such as the permanent magnet motor (PMM) originally planned for the Zumwalt class is another important design parameter that needs to considered and decided upon from the very beginning of the design process. Whatever the power plant settled on, it needs to provide enough electrical power to operate one railgun and associated radars, or the extensive radars, computers and refrigerated working space required by the CGs of tomorrow, or the power needs of a long range ballistic radar if installed. All that generation and conversion equipment needs the space provided by a 17,000 ton sized design.

Bridge, CIC, and Working Spaces

This issue comes to the forefront for the AAW class of cruiser that will replace the Ticonderogas. Computers are wonderful tools, capable of providing multiple ways to enable a fighting sailor. They are also demanding pieces of equipment that simply 'just have to be' at the right temperature, humidity level, amount of electrical power provided and discharged, and are highly intolerant of any variation in these conditions. Sailors are much easier to provide working space for.

But to be effective, the CGs of the future will also need plenty of thoroughly refrigerated space in the bridge, CIC, electronic equipment spaces, and working space for the sailors operating and maintaining all of this gear. And let us not forget the multiple radars that will be installed, ever growing in size and number, that also require space, power, and cooling inside the hull.

Therefore, designing a large, as uniform as possible set of working spaces behind the forward gun and before the ventilation stack, helicopter deck, and hangar is strongly recommended as a third set of crucial design criteria.

This author suggests applying the suggestions above in the cruiser classes listed and briefly described in the following sections.

CS – Scout Cruiser

Putting one railgun on a scout cruiser, with plenty of VLS and helicopter space for needed ISR drones, ASW oriented Seahawk, two Fire Scouts, and ten TFS buoys while completely independent of a CSG is a very useful addition to NATO we can make at a far lower cost than any aviation oriented asset. Particularly since there is a very useful mission for the cruiser class to perform, namely Backfire and Bear hunting in the North Atlantic, North Sea, or potentially even the Barents Sea.

CG – AAW Cruiser

The Navy is going to need fifteen plus AAW cruisers as replacements for the Ticonderoga-class as those Cold War veterans wear out. This class design is easily described as simply upsizing the Ticonderoga to 17,000 tons. Give the class the space and power the radars of today and tomorrow demand to be effective, plenty of CIC and electronic room space for the computers and sailors aboard, and as many VLS as practical and this ship class is ready to go.

CBD – Ballistic Missile Defense Cruiser

This author is far from convinced that putting a long range ballistic missile radar to sea is a wise and prudent idea. It almost certainly is not when in close proximity to a CSG, ARG, SSG or transoceanic convoy, at least on a routine basis.

That said, the majority of the world's seas are, almost by definition, not in close proximity to our primary ocean going assets. There very well may be occasions in the future when the U.S. Navy can provide a cost effective alternative for the president to consider making use of by building three CBD class cruisers.

This cruiser design is obviously dominated by the enormous radar mast mounted amidships. It is unlikely that a non-nuclear power plant will generate enough power for both radar and a railgun, so it will go to sea with our standard 5" weapon, as much of the base bridge, CIC, and electronic working spaces that can be accommodated once the huge ballistic radar requirements are met. It will also include as many VLS tubes that can be squeezed in, and a standard, one Seahawk-sized helicopter deck and hangar.

The reader can easily come up with alternative cruiser class designs of their own, whether improvements on the three suggestions above or for other mission requirements not considered in this article. But having a flexible base cruiser design on hand, available for development or alternation as the world changes around us seems to be an excellent investment in capabilities for the decades ahead.

CVLN, AORH, and CARN

The author has explored a variety of other ship designs in previous articles that form a part of the fleet design described here.

The CVLN (carrier aviation light, nuclear powered) is intended to operate with carrier task forces, providing a home for the many ISR drones, UUVs, UAVs and buoys needed in the increasingly dangerous A2/AD environment and to prosecute ASW.

The AORH (auxiliary oiler replenishment helicopter) is a ship class based on a

modified AOR-sized and double hulled design without a full flight deck, approximately 25,000 tons and oil powered. This class is intended to provide very substantial helicopter and VTOL launching and servicing capabilities for ASW, amphibious, special-ops or other missions and then executing these missions alongside a large variety of allied nation navies; hence the built in patrol boat capabilities as well as at least one UNREP station port and starboard.

The CARN (cruiser gun armor, nuclear powered) will accompany the fleet's capital ships to provide defensive AAW capabilities with a primary armament of twelve railguns in order to realize favorable cost exchanges.

Strategic Demands of the Threat Environment

For discussion purposes, this author assumes the usual conventional wisdom about the strategic intentions, announced and anticipated fleet construction plans and patrol utilization patterns of the various major Eurasian major powers are mostly true and applicable.

Russia

Russia has been consistent in describing her intentions in fleet building and disposition. Given her need to disperse naval assets to four widely separate parts of the world, establish and maintain her strategic ballistic missile force, and meet the need for substantial littoral forces, there is only limited Russian ability to impact U.S. interests far from her shores, certainly nothing like in Soviet days.

The Russians have been quite open in their intent to field enough attack submarines to reestablish a 21st century version of the old Soviet anti-convoy abilities in the North Atlantic. They also are aware of the opportunities that present themselves in disrupting trade and generating geopolitical influence in Northeastern Asian waters as well as the North Pacific; though they are frank that pursuing such a strategy in Pacific waters is some distance down their priority list. Given the many needs the Russian fleet has, having enough assets to operate effectively in the North Pacific may always remain a hope and intent rather than a reality.

As always with Russia, from the days of Ivan IV or Peter the Great onward, there is an enormous difference between Moscow's perceived military needs and her ability to fund them. This will remain true far into the 21st century, regardless of how much or little change Putin manages to introduce as a response to sanctions and the fall in the price of oil.

That said, Russian naval ambitions and intentions have been clearly stated and certainly include creating and maintaining a substantial nuclear powered attack submarine force to be deployed in the North Pacific, North Atlantic, and Arctic as needed. In addition, Moscow clearly intends to continue fielding enough A2/AD protected assets in the Eastern Mediterranean.

China

China has been consistently and thoughtfully expanding the PLANs capabilities and mission choices for years now. This expansion has been quite focused, foremost on improving China's home defense situation. The PLAN has also established abilities to protect and pursue her interests in and around the two island chains. Finally, China has developed modest naval expeditionary capability for ongoing use in the Indian Ocean.

To date there does not seem to be any interest in creating additional substantial capabilities in order to operate far from home waters, much less on the global scale like the U.S. Navy.

Unlike Russia, China does have the financial capability to expand the PLAN if desired, both today and in the decades to come. This capability, if exercised to construct substantial additional surface and attack submarine assets that could be targeted far out into the Central Pacific, beyond the Second Island Chain, would be the single greatest change in world conditions requiring a revision of the fleet building plan presented here.

Ships, and mission requirements, are flexible and can easily be targeted in different areas, and the waters from Taiwan/Okinawa to Guam to Hawaii are an obvious alternative for PLAN planners to study for opportunities. This author is not especially concerned about China's current fleet in this regard, but if future PLAN submarine building includes plentiful nuclear attack submarines beyond current needs and tasking, then the U.S. needs to seriously reassess how it will get fuel and munitions

delivered to Guam or Okinawa.

The interlinked issues that Taiwan and China's substantial A2/AD capabilities raise can be largely mitigated by adding the suggested CVLN and CARN assets on an ongoing basis to the CSG operating in the Western Pacific. A significant amount of deterrence can be obtained by making the necessary additional investment in these two new ship classes and the associated equipment and doctrine adjustments.

Other challenges presented by China's increasing presence and differing intentions in the region should be manageable, at least from the Navy's point of view, by appropriate deployment of the AORH, LCS, and other smaller ship classes that need to be built.

Persian Gulf/Indian Ocean

The many complicated rivalries that rend this part of the world show no sign of dissipating, meaning that the U.S. Navy will need to operate substantial assets on an ongoing basis in the area for decades to come.

The increasingly difficult challenges presented by the rise of Al Qaeda, Islamic State, and Iran's threats to close the Strait of Hormuz suggest the need for routine deployment of a task force operating independently of the CSG, centered on a AORH, one to two LCS, a LSD, and whatever associated or Allied assets are locally present at any given time for years to come.

NATO

The renewed challenge to NATO that is being made by Russia should be met with a different set of assets than were deployed during the Cold War. Modern day challenges in A2/AD capabilities, a more substantive Eastern Mediterranean presence, resumed Backfire and Bear patrols, and the intent to resume routine attack submarine patrols in the North Atlantic require a different set of fleet assets now and in the future.

Much of these changes will have to come ashore in various locations across Europe. As always the substantial littoral assets needed should be provided by our allies in NATO.

We do have unique abilities to provide, particularly the Aegis system whether at sea or installed ashore, and the new railgun. Establishing a routine task force centered on the suggested scout cruiser (CS) class and a handful of U.S. or other NATO nation frigates in the North Atlantic or North Sea as Backfire and Bear hunters would be a powerful way to reinforce NATO, and at a far lower cost than deploying already very busy CVN assets.

Convincing the German Navy to build and operate two or three ships similar in design as an AORH in Baltic waters or around the North Cape of Norway would also substantially improve NATO's ability to deal with the challenge Russia presents.

Ever Expanding A2/AD Threat

Threats posed elsewhere, which will almost always be less powerful than what China has built, will have to be met with a mixture of the new anti-drone, anti-missile weapon systems under discussion, the assistance of shore based assets or wide dispersal when operating in deep blue waters. All of our new assets should be built with the ability to flexibly add or subtract as needed new weapon systems as they are developed over the decades to come.

Suggested Fleet

The following fleet should be able to handle these challenges and threats well into the middle of the 21st century.

SHIP TYPE	CURRENT FLEET	PROPOSED 2045 FLEET
SSBN	13	12
SSGN	4	6
SSN (Seawolf-class)	3	0
SSN (Virginia-class)	12	24
SSN (Virginia-class extended)	0	12
SSN (Los Angeles class Flights I, II, 688i)	38	0
SSN (Los Angeles class Flight III)	0	24
CVN	11	11
CVLN (carrier aviation light, nuclear powered)	0	6
AORH (auxiliary oiler replenishment helicopter)	0	9
AORH (ice strengthened)	0	2
CARN	0	9
CS (scout cruiser)	0	3
CBD (ballistic missile cruiser)	0	3
CG (Ticonderoga replacements)	22	15
DDG (Zumwalt class)	3	3
DDG	66	57
FF (new transoceanic frigate)	0	30
FF (ice strengthened)	0	5
FP (new LCS frigate)	16	16

FM (Freedom class)	12	12
FM (Independence class)	12	12
EPF (formerly JHSV)	12	12
LHA/LHD	11	12
LCC	2	2
LPD/LXR	9	18
LSD (replacement LSD design – 12k tons)	12	18
ESD (formerly MLP)	2	4
ESB (formerly AFSB)	2	4
T-AO	15	17
T-AKE	12	12
AS	2	2

Conclusion

At just over 340 ships, this suggested fleet plan provides the U.S. Navy with an adequate number of vessels, while simultaneously adding needed new high-end surface ship designs and providing the numbers of smaller ships the nation needs now and will need into the future. As always, the time to start planning ahead is now.

Jan Musil is a Vietnam era Navy veteran, disenchanted ex-corporate middle manager, and long time entrepreneur currently working as an author of science fiction novels. He is also a long-standing student of navies in general, post-1930 ship construction thinking, design hopes versus actual results, and fleet composition debates of the twentieth century.

Featured Image: PACIFIC OCEAN (July 22, 2016) - The Nimitz-class aircraft carrier USS John C. Stennis (CVN 74) conducts a vertical replenishment with the Military Sealift Command fast combat support ship USNS Rainier (T-AOE 7) during Rim of the Pacific (RIMPAC) 2016. (U.S. Navy photo by MC2 Ryan J. Batchelder/Released)

Closing Remarks on Changing Naval Force Structure

By Wayne P. Hughes Jr.

The biggest deficiencies in reformulating the U. S. Navy's force structure are (1) a failure to take the shrinking defense budget into account which (2) allows every critic or proponent to be like the blind men who formulated their description of an elephant by touching only his trunk, tail, leg, or tusk. To get an appreciation of the size of the problem you have to describe the whole beast, and what is even harder, to get him to change direction by hitting him over the head repeatedly.

A good thesis to make the point is by LT Juan L. Carrasco, published in 2009, titled "A Manpower Comparison of Three U. S. Navies: The Current Fleet, a Projected 313 Ship Fleet, and a More Distributed Bimodal Alternative." It explores the number of fleet billets in (1) the then current 285 ship fleet (2) the proposed, now defunct, 313 ship Navy, and (3) a new fleet of over 650 vessels designed by nine members of the NPS faculty that included more than 260 smaller coastal warships. Carrasco showed, remarkably enough, the NPS-designed fleet required the fewest afloat billets. Looking at the details reveal why. One major reason was that the then-current Navy's eleven CVNs took 46% of all fleet billets in 285 ship navy, so when the NPS-designed fleet cut the number of CVNs to six and added more than a dozen small sea-based air platforms, then they were more distributable 100,000 ton carriers. The smaller ones, more like a CVL in size, can operate in littoral waters where a CVN wing is more than is needed for long term littoral operations. Thus, there were enough billets to more widely distribute across the NPS fleet.

Those who haven't thought about all the elements of a 600-ship navy will have a lot of questions about logistics, flying off smaller carriers, new tactics to accompany the new technologies, procedures to deal with warships damaged from missile attacks, and so forth. The Navy must confront its budget crunch while needing to buy more expensive missiles in greater numbers, restoring the SSBN fleet, sustaining the APN dollars to buy ever-more expensive aircraft, supporting Marine expeditionary operations, structuring an offensively capable surface ship fleet, building up—or merely sustaining—our increasingly valuable submarine forces, and maintaining enough CLF ships to take some losses and continue to maintain the fleet forward. This will take a lot more original thinking about the role of unmanned and robotic vehicles of many kinds, more teaming with partner nations, forward bases that support our friends in East Asia and Europe, applications of offensive cyber warfare, achieving more stealthy C2 ways to attack effectively first, all to achieve the end goal of building a more distributable, combat ready 21st century U. S. Navy.

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Featured Image: PHILIPPINE SEA (Sept. 23, 2016) The forward-deployed Arleigh Burke-class guided-missile destroyer USS Barry (DDG 52) steams in formation with, from left to right, the amphibious transport dock ship USS Green Bay (LPD 20), the amphibious assault ship USS Bonhomme Richard (LHD 6), the amphibious dock landing ship USS Germantown (LSD 42), USS Ronald Reagan (CVN 76), the Arleigh Burke-class guided-missile destroyer USS Benfold (DDG 65), the Ticonderoga-class guided-missile cruiser USS Chancellorsville (CG 62), and the Arleigh Burke-class guided-missile destroyer USS Stethem (DDG 63) during a photo exercise during Valiant Shield 2016. (U.S. Navy photo by Mass Communication Specialist 2nd Class Kevin V. Cunningham/Released)

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